SAPC No. 7738
Copy No. 3 of 7

12 July 1956

Dear Burt,

In my telephone conversation of 5 July, you quoted ten microvolts as the sensitivity of System Three. In response to my question, you then gave 100 ohms as an estimate of the input impedance. It is recognized that these figures may be only approximate, but the following calculations based on these figures may be of interest to you.

Input power sensitivity $(\frac{E^2}{R}) = (\frac{10 \times 10^{-6}}{100})^2 = 10^{-12}$ watts, converted to decibels below a milliwatt = -90 dbm. However, the best measure of a receiver's performance is its noise factor. The noise factor is defined as the receiver's sensitivity compared with that of an ideal receiver operating at an ambient temperature of 20°C. The ideal receiver with the same specifications as System Three would have a sensitivity of -126 db. (This figure is the Johnson noise level that would exist in the receiver's input circuit.)

From the above, one can see that the System Three receiver is 36 db. less sensitive than the ideal receiver or in other words, has a noise factor of 36 db.

The present state of receiver development in the VHF region has produced receivers for field use with noise factors of 5 db. (average over the band). The usual commercial receiver is not this good, running from 10 to 15 db. noise figure. In order to get the 5 db. figure, it has been necessary to use the W.E. 416B tube and exert considerable effort in design but 15 db. is considered poor. NRL has been modifying 15 db. receivers to bring their noise factor down to 8 db.

It would seem that the noise figures of the R.F. preamplifier given on Page 7 of Document OMCC No. 1133.7 have degenerated unduly in the succeeding stages of the system.

We will be interested in your final measurements of the sensitivity of System Three.

Sincerely,

s/
Jim

ESO/JFS:jd (12 July 56)
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